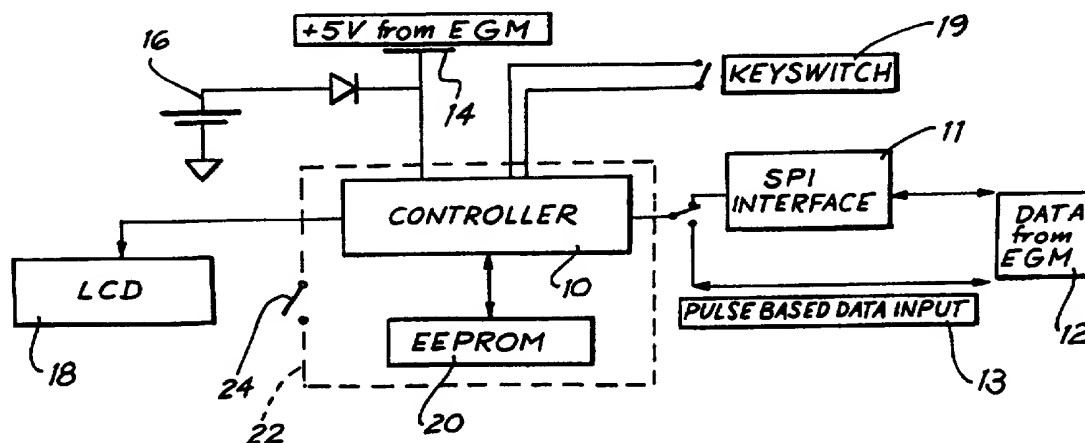




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: HARD METER FOR GAMING MACHINE



(57) Abstract

An electronic gaming machine (2) including a meter assembly is disclosed. The meter assembly comprises a controller (10) operatively connected to receive data (12) from an electronic gaming machine (2), an electronically erasable programmable read only memory (20) operatively connected to the controller, and a display means (18) operatively connected to the controller (10). The present invention simplifies the manufacture of the gaming machine (2) since only one meter assembly is required. The memory (20) can store data relating to many different functions of the machine (2) such as coins input, jackpot size etc. The display means is an alphanumeric LCD display (18) and a key-switch (19) is used to enable the display (18) thereby restricting access to the metered data (12).

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HARD METER FOR GAMING MACHINE

Field of the Invention

The present invention relates to gaming machines of the type
5 generally referred to as slot machines, fruit machines or poker machines, and
in particular, the invention provides a hard meter for use in such machines.

Background of the Invention

Gaming or poker machines have been well known in the state of New
South Wales for many years, and have more recently gained considerable
10 popularity throughout Australia, with quite substantial amounts wagered on
these machines. Such machines have also been popular in various casinos
throughout the world for many years. There is a growing tendency for State
Governments to legalise the use of gaming machines by licensing operators,
with resulting revenue gains through licence fees and taxation of monies
15 invested. The licensed operation of gaming machine is the subject of state
legislation and regulation. The regulations almost always dictates a
minimum percentage payout for a gaming machine, for example, a minimum
of 85% of monies invested must be returned as winnings. A manufacturer of
gaming machines must therefore design their machines around these
20 regulatory controls.

To ensure that each gaming machine is operated within the
regulations, and to allow auditing of gaming machines, electro-mechanical
hard meters are installed in gaming machines. Gaming machines often
include up to eight such meters, one meter may record the number of coins
25 put into the machine. Other meters may record the number of coins paid
out, the number of games won, the number of games played, the amount of
cancelled credits, the total money in, or the total money out. The meters
record such data and other data relating to machine functions as required by
the relevant regulations of the State or Country in which the gaming
30 machine is installed. Each item of data relating to a machine function which
has to be recorded has its own associated meter. That arrangement enables
the gaming machine to be audited to check that the machine is being
operated under the guidelines of that particular State or Country and that the
correct taxes have been paid for that machine. The meters must be "hard" -
35 ie. they must retain their data when the machine is powered down. The
meters comprise electro-mechanical counters which, as is well known,

operate by stepping a series of reels bearing the numbers 0 to 9. To save space, the reels of the electro-mechanical counters commonly used in gaming machines tend to be very small and the size of the figures on the reel can be as small as 1mm. The meters are located inside the housing of the gaming machine, and a torch is usually required to enable an engineer, or the like, to read the meter. The above makes meter reading a time consuming and awkward process, particularly since eight such meters may have to be read.

It is an object of the present invention to alleviate the above-mentioned disadvantages.

Summary of the Invention

Thus according to the present invention there is provided a meter assembly for an electronic gaming machine, including a gaming machine control unit, the meter assembly comprising:-

- 15 a controller adapted to be operatively connected to the control unit of the gaming machine so as to receive data, including data values related to selected gaming machine functions, from the electronic gaming machine;
- a non-volatile memory (such as an electrically erasable programmable read only memory (EEPROM), a static random access memory (SRAM) coupled to a back-up battery, a ferroelectric random access memory (FRAM), a non-volatile random access memory (NVRAM) or a Flash memory). operatively connected to the controller and adapted to store data supplied by the controller including a data value for selected gaming machine functions and, optionally, an indication of what machine function each stored data value relates to; and
- 25 a display means operatively connected to the controller for displaying data values stored in the electrically erasable programmable read only memory.

The meter assembly of the present invention may be retro-fitted to existing gaming machine to replace the existing electro-mechanical hard meters used in such machines. The present invention also provides a gaming machine incorporating the meter assembly of the present invention.

The present invention simplifies the manufacture of the gaming machine since only one meter assembly is required. The memory can store data relating to many different functions of the machine.

It is preferred that the non-volatile memory may be socketed.

In a preferred embodiment the display means is an alpha numeric LCD display. It is preferred that a key-switch is used to enable the display thereby restricting access to the metered data.

5 In a preferred embodiment once displaying of the metered data has been enabled by turning the key-switch to the on position, data value relating to a first machine function, say the number of coins inserted into the machine, is presented on the LCD. After a period of time, typically 5 to 10 seconds, the display then progresses to the next data value, relating to second machine function and so on.

10 To enable the metered data to be viewed when the electronic game machine is powered down a backup battery is provided to power the LCD and controller during this period.

It is preferred that the system is arranged so that the back light for the LCD display is not powered by the back-up battery during power down conditions. This arrangement prevents excessive drain on the battery's power, since powering a light uses a lot of energy.

15 Conveniently, the controller may include means for predicting when the back-up battery is low, or about to fail, and displaying a message on the LCD to that effect.

20 Conveniently, a metal enclosure is provided which encloses at least the controller, the enclosure being provided within the body of the electronic gaming machine.

Brief Description of the Drawings

25 The invention will now be described by way of example only and with reference to the accompanying drawings in which:-

Figure 1 shows a gaming machine cabinet;

Figure 2 is a schematic diagram of a metering system embodying the present invention; and

Figure 3 is a schematic diagram of a slot machine control circuit.

Detailed Description of the Preferred Embodiment

30 Referring to Figure 1, the illustrated embodiment of the present invention is housed in a conventional slot or gaming machine cabinet 2 including a prize display 4, a coin entry slot 6, a payout tray 8, a game display means 9, and internally mounted game control processor circuits, (refer to Figure 3).

Typically, the game display means 9 comprises a video display screen controlled to display images of the game being played such as cards dealt in a particular hand if the gaming machine is programmed to play a card game such as poker, or simulations of rotating reels if the machine is a "fruit machine". The video screen is preferably of the touch sensitive variety, having an array of touch sensitive areas located on the screen surface. Player controls are implemented by displaying images corresponding to controls on the screen such that when the control images are touched, the associated function is caused to be performed.

Turning to figure 2 which illustrates the meter system of the preferred embodiment of the present invention, a controller 10 is operatively connected to receive data from a serial peripheral interface 11 (SPI interface) of a standard gaming machine control processor 12 of an electronic gaming machine EGM. As is well known, this processor 12 forms part of a gaming machine control unit 30 which drives the display screen 9 and receives touch input signals from the touch sensors 32 as well as receiving coin input pulses from a coin chute mechanism 33, and driving a coin payout mechanism 34. Alternatively, cash credits may be remotely transferred to and from the gaming machine control unit 30 electronically via an external central credit control unit linked to a number of gaming machines.

Instead of being connected to the SPI interface, the controller may receive pulse based data input 13 from a communication link with the control unit 12 of the electronic gaming machine. The controller is powered by a 5 volt power supply 14 from the electronic gaming machine.

A back-up battery 16 is provided which can supply electrical power to the controller if the electronic gaming machine is powered down.

The controller 10 is connected to an alpha numeric LCD display 18 turned on and off via a key-switch 19, and to an electrically erasable programmable read only memory EEPROM 20.

In use, information which would normally be stored on a number of electro-mechanical hard meters is transferred from the control unit 12 of the electronic gaming machine along the SPI interface 12 to the controller 10.

The data is then transferred to the EEPROM 20 from the controller and written serially onto the EEPROM 20. The EEPROM 20 does not require power to maintain data once that data has been written to the EEPROM, therefore even if the power supply to the system fails or is switched off, the

information will still be held on the EEPROM 20. The system is therefore as tamper proof as existing electro-mechanical hard meters for gaming machines. The battery 16 is not necessary for maintaining information already written to the EEPROM.

5 An EEPROM has a high, but limited, number of times (approximately 100,000 times) which data can be written to a particular location on the EEPROM. Therefore the controller also includes means for recording how many times the EEPROM has been serially written so that it can be replaced when necessary.

10 In existing electronic gaming machines each time data relating to a metered function of the machine changes eg. a coin is entered into the machine, the reel of the associated dedicated electro-mechanical hard meter must be stepped to record that event. In the present embodiment, data can be held in the controller for a period of time before it is transferred to the
15 EEPROM. So for example if ten coins are inserted into the machine, instead of incrementing a reel of an electro-mechanical meter ten times, once for each insertion of a coin into the machine, the controller stores the information relating to the ten events and then merely increments the data in the EEPROM relating to the insertion of coins by ten, once only. The
20 system is arranged so that if the electronic gaming machine powers down while there is still information in the controller which needs recording in the EEPROM, the controller is powered by the back-up battery or retains enough power from the electronic gaming machine to transfer that information on
25 the EEPROM and does so, as soon as the electronic gaming machine powers down. The battery should ensure that the controller 12 shuts down after the EGM, when the EGM is shut down.

 The EEPROM also contains a labelling/description of each "meter" as well as the value associated with that meter.

30 The LCD display includes a key switch which is required to enable the display and which thus restricts access to the metered data to authorised keyholders.

 In operation, once the key switch has been turned to the on position to enable displaying of metered data, the information stored relating to the first metered data is presented on the LCD. After a period of time, normally
35 five to ten seconds the display progresses to the next meter's value and so on.

The alpha numeric LCD display will show a label or description, which identifies what metered data is being shown (up to eight characters) and a value of up to ten digits for each meter. Hence a twenty by one or sixteen by two LCD display can be used for displaying the metered data.

5 The controller is arranged so that the sequential display process can be accelerated by operating the key switch to the section on off on within a short period, being approximately two seconds. This immediately steps the display to the next meters value.

10 The timed cycling or stepping through of all the meter values continues until the key switch is turned to the off position for a period greater than two seconds whereby the display will become blank.

15 At least the controller 10 is enclosed in a metal enclosure or casing 22. This is necessary to maintain the security of the meter. The system includes means to detect opening of the metal enclosure by means of a micro switch 24. Opening of the metal enclosure may be detected even when the electronic gaming machine or control unit is powered down. It is preferred that the entire system is housed in a single location this location being the location at which the LCD is to display the metered data. In the embodiment in which the system is located in a single location the cabling to the controller and the display consists of a single unbroken cable extending from the electronic gaming machine logic cage which houses the control unit, into the electronic metering system metal enclosure.

20 In an alternative embodiment in which the system is not located at a single location, due for example to insufficient space, the controller 10 is housed in a metal enclosure in the body of the electronic gaming machine. A single unbroken cable extends from the electronic gaming machine logic cage into the controller. Another cable extends from the controller to the LCD display 18. The LCD is also housed in a metal container.

30 The hard meter system of the present invention may be retro-fitted to existing electronic gaming machines. The keyswitch may be retro-fitted to the existing machine or alternatively another pole may be added to an existing key-switch on the machine.

Thus the present invention provides a system which can replace an array of electromechanical meters which does not have to be stepped in the manner of the reels of electro-mechanical meters, which is easy to read and where values which would normally be stored on a number of different
5 meters can all be displayed on the same display serially.

Although the specific embodiment describes a meter assembly including a EEPROM, it will be appreciated that the EEPROM could be replaced by other type of non-volatile memory such as static random access memory (SRAM) coupled to a back-up battery, ferroelectric random access
10 memory (FRAM), non-volatile random access memory (NVRAM), or Flash memory.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the
15 invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A meter assembly for an electronic gaming machine, the electronic gaming machine including a gaming machine control unit , the meter assembly comprising:-
 - 5 a controller adapted to be operatively connected to the control unit of the gaming machine so as to receive data related to selected gaming machine functions, from the electronic gaming machine;
 - a non-volatile memory operatively connected to the controller and adapted to store data supplied by the controller including a data value for
 - 10 selected gaming machine functions; and;
 - a display means operatively connected to the controller for displaying data values stored in the non-volatile memory .
2. A meter assembly as claimed in claim 1 wherein the non-volatile memory also stores an indication of which machine function a stored data
- 15 value relates to.
3. A meter assembly as claimed in claim 1 or claim 2 wherein the stored data values are selected from one or more of :-
 - the number of coins put into the gaming machine;
 - the number of coins paid out;
 - 20 the number of games won;
 - the number of games played;
 - the amount of cancelled credits;
 - the total money in; and
 - the total money out.
- 25 4. A meter assembly as claimed in any preceding claim including a key operated switch adapted to enable the display means thereby restricting access to the data stored in the non-volatile memory.
5. A meter assembly as claimed in claim 4 wherein the controller is arranged in such a manner that in use, after the display means has been
- 30 enabled by turning the key-operated switch to the on position, a first data value relating to a first machine function is first displayed on the display means and then, after a predetermined period of time, the display means then progresses to display a second data value, relating to a second machine function and then sequentially displays further data values relating to
- 35 further machine functions stored in the non-volatile memory at predetermined intervals.

6. A meter assembly as claimed in any preceding claim wherein the display means is an alpha numeric LCD display, and including a battery adapted to supply power to the LCD display and controller.
7. A meter assembly as claimed in claim 6 wherein the controller
5 includes means for predicting when the battery is low, or about to fail, and is adapted to display a message warning of the state of the battery on the display means.
8. A meter assembly as claimed in any preceding claim wherein the non-volatile memory also stores a data value relating to the number of times
10 that it has been written..
9. A meter assembly as claimed in any preceding claim wherein the controller stores data values for a period of time, operates in or sums the data values where appropriate before transferring those data values to the non-volatile memory so that data is only periodically transferred to the non-
15 volatile memory
10. A meter assembly as claimed in any preceding claim including a protective enclosure or cage disposed around the control means, which cage or enclosure includes a microswitch for detecting opening of the enclosure and wherein the microswitch is arranged to permit the recording of the
20 opening of the enclosure.
11. A meter assembly as claimed in any preceding claim wherein the non-volatile memory is one of:-
an electrically erasable programmable read only memory (EEPROM),
or a static random access memory (SRAM) coupled to a back-up battery, or a
25 ferroelectric random access memory (FRAM), or a non-volatile random access memory (NVRAM) or Flash Memory.
12. A meter assembly as claimed in any preceding claim wherein the non-volatile memory may be socketed.
13. An electronic gaming machine including a gaming machine control
30 unit for driving a screen of the gaming machine and receiving input signals relating to the playing of a game, and a meter assembly comprising:-
a controller operatively connected to receive data relating to gaming machine functions, from the control unit of the electronic gaming machine;
a non-volatile memory operatively connected to the controller and
35 adapted to store data supplied by the controller including a data value for selected machine functions; and

a display means operatively connected to the controller for displaying data values stored in the non-volatile memory.

14. An electronic gaming machine as claimed in claim 13 wherein the memory also stores an indication of which machine function a stored data value relates to.

15. An electronic gaming machine as claimed in claim 13 or 14 wherein the stored data values are selected from:-

the number of coins put into the gaming machine;

the number of coins paid out; and

the number of games won;

the number of games played;

the amount of cancelled credits;

the total money in; and

the total money out.

16. An electronic gaming machine as claimed in any one of claims 13 to 15 wherein the display means is an alpha numeric LCD display.

17. An electronic gaming machine as claimed in any one of claims 13 to 16 including a key-operated switch adapted to enable the display means thereby restricting access to the data values stored in the non-volatile memory.

18. An electronic gaming machine as claimed in claim 17 wherein the controller is arranged in such a manner that in use, after the display means has been enabled by turning the key-operated switch to the on position, a first data value relating to a first machine function is first displayed on the display means and then, after a predetermined period of time, the display means then progresses to display a second data value, relating to a second machine function and then sequentially displays further data values relating to further machine functions stored in the non-volatile memory at predetermined intervals.

19. An electronic gaming machine as claimed in any one of claims 13 to 18 wherein a back-up battery is provided so that when the electronic gaming machine is powered down the battery may provide power to the display means and the controller.

20. An electronic gaming machine as claimed in claim 19 wherein the LCD display includes a back light and the back light is not arranged to be powered by the back-up battery during power down conditions.

21. An electronic gaming machine as claimed in any one of claims 19 to 20 wherein the controller includes a means for predicting when the back-up battery is low, or about to fail, and for displaying a warning message on the display means.
- 5 22. An electronic gaming machine as claimed in any one of claims 13 to 21 including an enclosure provided in the body of the electronic gaming machine and wherein at least the controller is disposed in the enclosure, which enclosure includes a microswitch for detecting opening of the enclosure and wherein the microswitch is arranged to permit the recording
10 of the opening of the enclosure.
23. An electronic gaming machine as claimed in any one of claims 13 to 22 wherein the non-volatile memory also stores a data value relating to the number of times that it has been written.
- 15 24. An electronic gaming machine as claimed in any one of claims 13 to 23 wherein the controller stores data values for a period of time before transferring that data to the non-volatile memory so that data is only periodically transferred to the non-volatile memory
25. An electronic gaming machine as claimed in any one of claims 13 to 24 wherein the non-volatile memory is one of:-
20 an electrically erasable programmable read only memory(EEPROM), a static random access memory(SRAM) coupled to a back-up battery, a ferroelectric random access memory(FRAM), a non-volatile random access memory (NVRAM) or a Flash memory.
26. An electronic gaming machine as claimed in any one of claims 13 to
25 25 wherein the non-volatile memory may be socketed.

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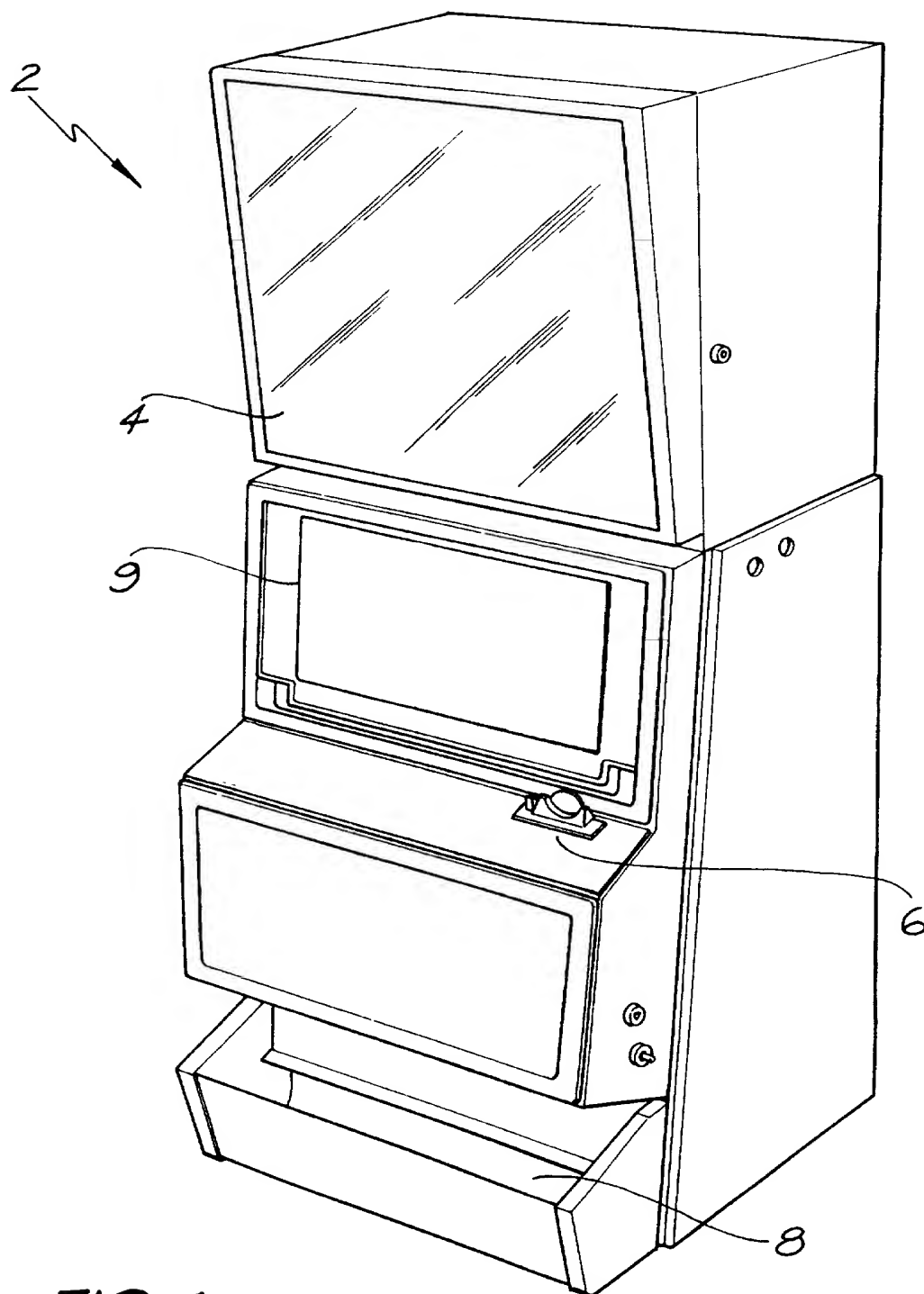


FIG. 1

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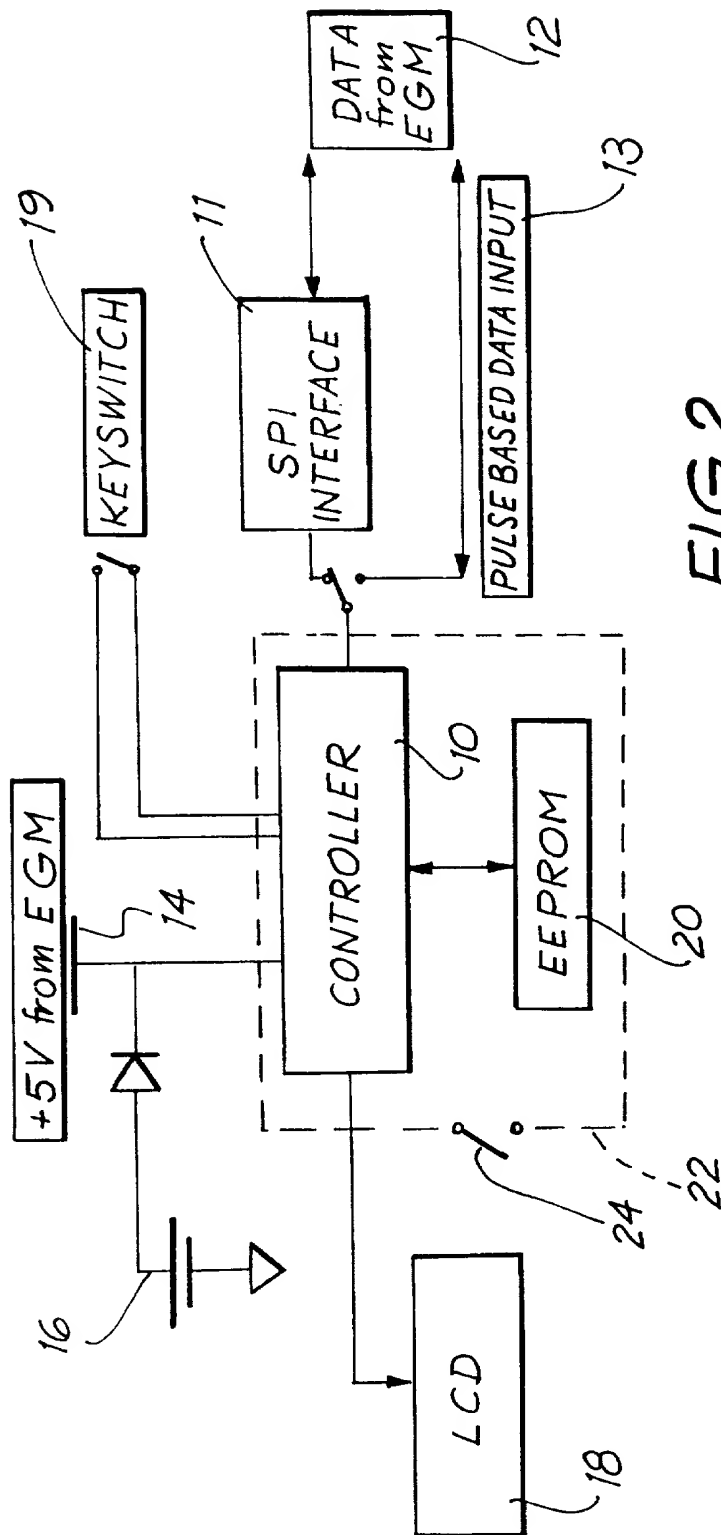
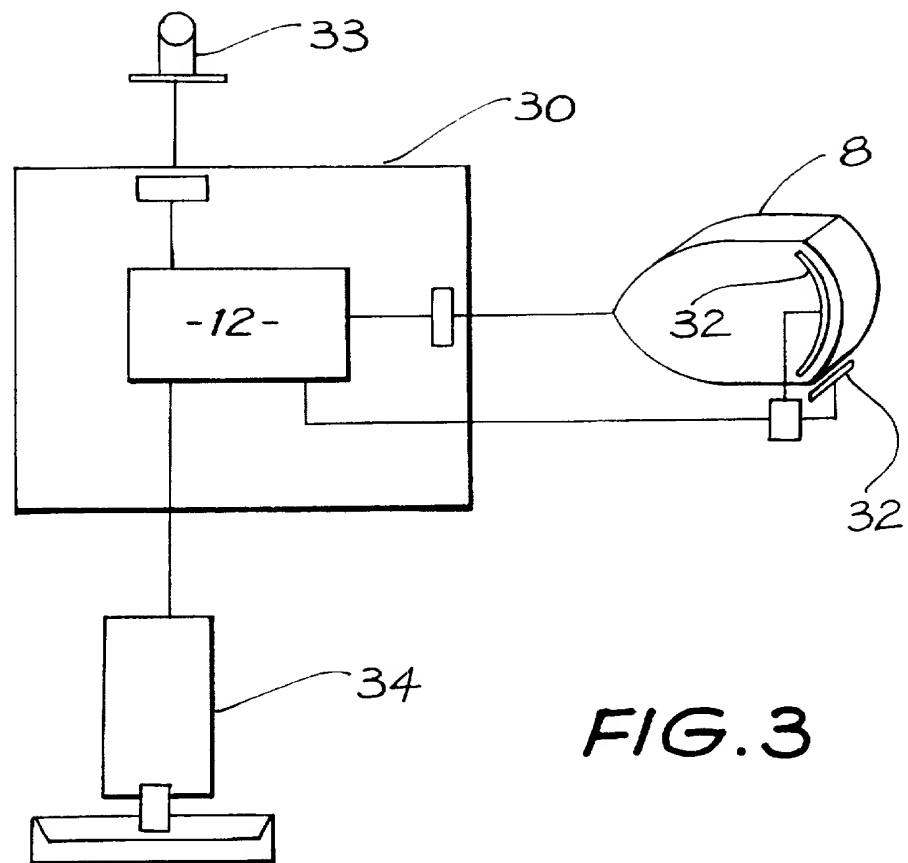


FIG. 2

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A. CLASSIFICATION OF SUBJECT MATTER					
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According to International Patent Classification (IPC) or to both national classification and IPC					
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC AS ABOVE.					
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DERWENT] Memory, Recorder, Volatile, Meter: JAPIO:]					
C. DOCUMENTS CONSIDERED TO BE RELEVANT					
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.			
X	GB 2 124 418 A (COIN CONTROLS LIMITED) 15 February 1984. Whole specification	1-3, 6, 9, 10-16, 19, 22, 24-26.			
X	AU 25946/84 (542455)B (OKADA) 04 October 1984. Whole specification	1-3, 9, 11-15, 24.			
<div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex </div>					
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Date of the actual completion of the international search 28 July 1997		Date of mailing of the international search report 07 AUG 1997			
Name and mailing address of the ISA/AU AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No.: (06) 285 3929		Authorized officer M.E. DIXON Telephone No.: (06) 283 2194			

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 97/00405

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 97/00405

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Patent Document Cited in Search Report			Patent Family Member				
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AU	25946/84	JP	59 177 084				
EP	638 882	ES	1 025 151	BG	98 972	CZ	9 401 944
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		NO	902 416	DE	69 027 745	ES	2 090 098
		KR	9 701 626	US	5 114 157		

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DERWENT-WEEK: 199825

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TITLE: Meter assembly for electronic gaming machine e.g. slot, fruit, poker machine has key operated switch that enables display device thereby restricting access to data stored in non-volatile memory

INVENTOR: ENGEL G S; HWANG J ; HWANG J S F

PATENT-ASSIGNEE: ARISTOCRAT LEISURE IND PTY LTD
[ARISN]

PRIORITY-DATA: 1996AU-000704 (June 27, 1996)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
WO 9800818 A1	January 8, 1998	EN
AU 9731606 A	January 21, 1998	EN

DESIGNATED-STATES: AU DE US AT BE CH DE DK ES FI
FR GB GR IE IT LU MC NL PT SE

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
WO1998000818A1	N/A	1997WO- AU00405	June 26, 1997
AU 9731606A	Based on	1997AU- 031606	June 26, 1997

INT-CL-CURRENT :

TYPE	IPC DATE
CIPS	G07F17/32 20060101
CIPS	G07F17/34 20060101

ABSTRACTED-PUB-NO: WO 9800818 A1**BASIC-ABSTRACT :**

The device includes a controller adapted to be operatively connected to the control unit of the gaming machine so as to receive data related to selected gaming machine functions, from the electronic gaming machine. A non-volatile memory operatively is connected to the controller and adapted to store data supplied by the controller including a data value for selected gaming machine functions. A display device operatively connected to the controller for displaying data values stored in the non-volatile memory. The stored data values are selected from one or more of the number of coins put into the gaining machine. A key operated switch is adapted to enable the display

device thereby restricting access to the data stored in the non-volatile memory.

ADVANTAGE - Simplifies manufacture of gaming machine since only one meter assembly is required.

CHOSEN-DRAWING: Dwg.2/3

TITLE-TERMS: METER ASSEMBLE ELECTRONIC GAME
MACHINE SLOT FRUIT POKER KEY
OPERATE SWITCH ENABLE DISPLAY
DEVICE RESTRICT ACCESS DATA
STORAGE NON VOLATILE MEMORY

DERWENT-CLASS: T01 T05 W04

EPI-CODES: T01-J05A; T01-P02; T05-H05E; W04-
X02A8;

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Non-CPI Secondary Accession Numbers: 1998-069194